Lightway

Power for a changing world

LIGHTWAY PV MODULES

Installation Manual

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INTRODUCTION

Thank you for choosing lightway green new energy Co., Ltd. Photovoltaic(PV) modules. With proper operation and maintenance, Lightway Green new energy PV modules will provide you with clean, renewable solar electricity for many years. This manual contains important installation, maintenance and safety information. Retain this installation manual for future reference. The word "module" as used in this manual refers to one or more photovoltaic modules.

GENERAL INFORMATION

The installation of solar modules requires a great degree of skills and should only be performed by qualified licensed professionals, including, without limitation, licensed contractors and licensed electricians.

Warning

⊙ All instructions should be read and understood before attempting to install, wire operate and maintain the photovoltaic module. Contact with electrically active parts of the module such as terminals can result in burns, sparks, and lethal shock whether the module is connected or disconnected.
⊙ The installer assumes the risk of all injury that might occur during installation, including, without limitation, the risk of electric shock.
⊙PV modules generate DC electrical energy when exposed to sunlight or other light sources. Although single modules produce only a low voltage and current, shocks and burns are still a potential hazard.
⊙ To avoid the hazard of electric shock and injury, cover all over the front surface of PV modules with a dense opaque material such as the cardboard box during installing and handling modules.
⊙The shock hazard increases as modules are connected in parallel producing higher current. The shock hazard increases as modules are connected in series producing higher voltages.
⊙ To avoid the hazard of electric shock, work only under dry conditions, with dry module and tools.
⊙ Do not stand or step on a module to avoid the hazard of injury and the damage to a module.
⊙ Do not damage the back sheet of a module, to avoid the hazard of electric shocks and fire.
⊙ To avoid the hazard of electric shock and injury, children and unauthorized persons should not be allowed near the installation of PV modules.
⊙ To avoid the hazard of electric shock and injury, do not disconnect during load connection.
⊙ To avoid the hazard of electric shock and injury, be sure to ground the modules completely.
⊙ To avoid the hazard of electric shock, fire and injury, do not disassemble the module, or remove any part installed by the manufacturer.
⊙ Unauthorized persons should not open the cover of the junction box to avoid the hazard of electric shock.
⊙ Do not touch terminals while a module(s) is exposed to light. Provide suitable guards to prevent you contacting directly with 30 VDC or greater to avoid the hazard of electric shock or injury.
⊙ When carrying a module, more than two persons should carry it by the frame and wear non-slip gloves to avoid the hazard of injury by slipping down the module on a foot or cutting by an edge of the frame and so on.

⊙ Do not carry a module by wire or junction box to avoid the hazard of electric shock and injury or any trouble in a module.
⊙ Do not drop anything on the surfaces of modules to avoid the hazard of electric shock and injury or any trouble.
⊙ To avoid the hazard of electric shock and fire, be sure that other system components do not cause any hazard of any mechanical or electrical nature to the module.
⊙ Since sparks may be generated, do not install module where flammable gases or vapors are present.
⊙ Never leave a module unsupported or unsecured. Do not drop module and do not allow objects to fall on module to avoid the hazard of injury or any trouble in modules.
⊙ Do not use or install broken modules to avoid the hazard of electric shock and injury.
⊙ Artificially concentrate sunlight shall not be directed on the module to avoid the hazard of fire or any trouble.
⊙ Do not touch the junction box terminals to avoid the hazard of electric shock and injury.
⊙ Do not change wiring of bypass diodes to avoid the hazard of electric shock and injury.
⊙ Use module for its intended function only.
⊙ Do not treat the back sheet and front surface with paint or adhesives to avoid any troubles.
⊙ Consult your local authority for guidelines and requirements for building or structural fire safety.
⊙ Roof constructions and installations may affect the fire safety of a building; improper installation may create hazards in the event of a fire
⊙ Use components such as ground fault circuit breakers and fuses as required by local authority.
⊙ The modules have been rated Fire Class C, and are suitable for mounting on to a Class A roof.

Cautions

Follow all permission, installation and inspection requirements.
⊙ Before installing module, contact appropriate authorities to determine permission, installation and inspection requirements, which should be followed. This should be done not only for installations in conjunction with buildings, but also for marine and motor vehicle applications for which additional requirements may apply.
⊙ Be sure that the construction intended to install modules on its rooftop has enough strength. For modules mounted on roof, special construction may be required to help provide proper installation. Both roof construction and module installation design have an effect on the fire resistance of the building. Improper installation may contribute to hazards in the event of fire. Additional devices such as ground fault, fuses and disconnects may be required.
⊙ Do not use modules of different configurations in the same system.
⊙ Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the value of Isc and Voc marked on this module should be multiplied by of 1.25 when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output.
⊙ Module application: Class A (modules rated for use in this application class maybe used in systems operating at greater than 50V DC or 240W, there general contact access is anticipated, Modules qualified for safety through this part of IEC61730 and IEC61730-2 and within this application class are considered to meet the requirements for safety Class Ⅱ.)
⊙ The recommended stand-off height is about 115mm, if other mounting means are employed, this may affect the listing for Fire Class Ratings. When installed on a roof, the module shall be mounted over a fire-resistant roof, and the mounting design may have an impact on the fire resistance.

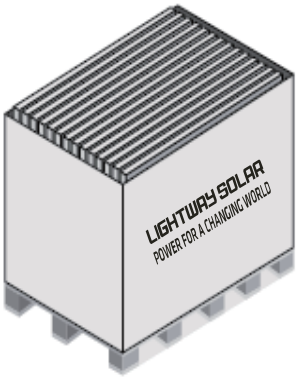
Product identification

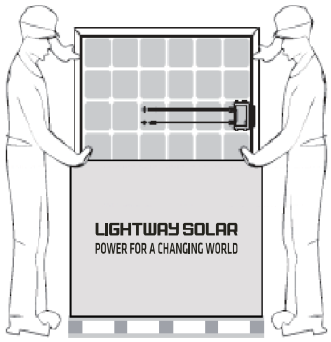
Each module has two labels providing the following information:
Nameplate: describes the product type; rated power, rated current, rated voltage, open circuit voltage, short circuit current, all as measured under standard test conditions; dimension etc. The maximum system voltage is 1000 volts DC and is shown on the nameplate. Maximum fuse rating is also shown.
Bar code: each individual module has a unique serial number. The 6th and 7th digits are the year code, the 8th and 9th digits are the month code, for example, LWxxx1301xxxxxx means the module was made in January 2013. There is only one barcode on module. It is permanently attached to the interior of the module visible when viewing from the front of the module. This bar code is inserted at the beginning of laminating.

Typical serial number barcode label

TRANSPORT AND HANDLING

Lightway PV modules must be transported in the supplied packaging only and kept in the packaging until they are ready to be installed. Protect pallets against movement and exposure to damage during transportation. Secure pallets from falling over. Do not exceed the maximum height of pallets to be stacked, as indicated on the pallet packaging. Store pallets in a cool and dry location until the PV modules are ready to be unpackaged.





Lightway PV modules are heavy, and should be handled with care. PV modules shall be handled at the frame; never use the junction box or cables as a grip. Do not exert mechanical stress on the cables. Never step on PV modules or drop or place heavy objects on them. Be careful when placing PV modules on hard surfaces, and secure them from falling. Broken glass can result in personal injury. PV modules with broken glass cannot be repaired and must not be used. Broken or damaged PV modules must be handled carefully and disposed of properly.
When unpack PV modules from the Lightway supplied packaging, first remove the pallet lid (after removing securing straps, if provided). Remove PV modules once at a time by sliding them up the channel in the package. You may need to secure the remaining PV modules in the pallet packaging to prevent them from falling over.

Check PV modules for damage due to transportation before they are installed; do not install damaged modules. Contact the company you purchased the Lightway PV modules from in order to obtain information on making claims for defective PV modules.
PV module surfaces are susceptible to damage that could affect the performance or safety of the PV module; do not damage or scratch the PV module surfaces, and do not apply paint or adhesive to any of the surfaces, including the frame. For your safety, do not disassemble or modify Lightway PV modules in any way, otherwise may degrade performance or cause irreparable damage and will void any applicable warranties.
If it is necessary to store PV modules prior to installation, the PV modules should remain inside the packaging and protected from exposure that could compromise the durability of the packaging.

Selecting the location

⊙ Select a suitable location for installation of the module.
⊙ The module should be facing true south in northern latitudes and true north in southern latitudes for best power production.
⊙ For detailed information on the best elevation tilt angle for the installation, refer to standard solar photovoltaic installation guides or a reputable solar installer or systems integrator
⊙ The module should not be shaded at any time of the day.

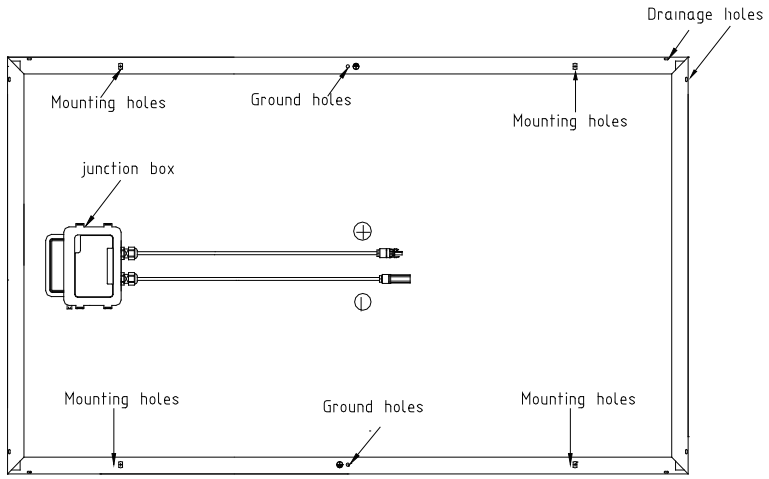
Selecting the proper support frame

⊙ Always observe the instructions and safety precautions included with the support frame to be used with the module.
⊙ No attempt must be made to drill holes in the glass surface of the module. To do so will void the warranty.
⊙ Do not drill additional mounting holes in the frame of the module. Doing so will void the warranty.

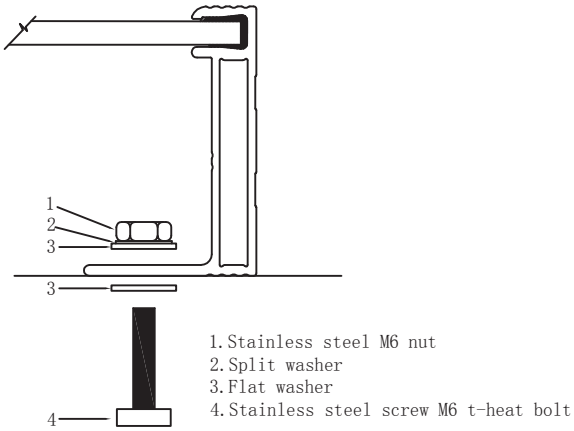
Installation method

Bolt Mounting:

Modules must be securely attached to the mounting structure using all of the mounting points for installation.



Installation diagram

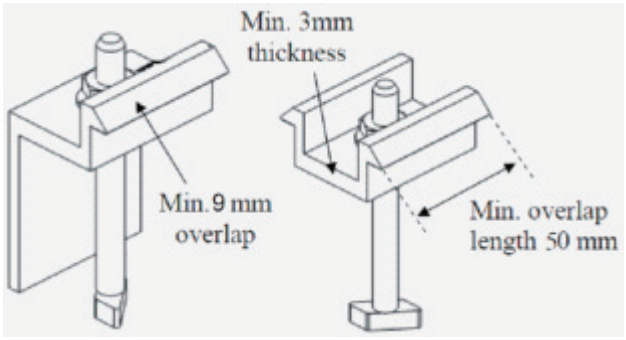


Detail of a bolt mounting attachment

The solar module frame shall be installed with a rack structure by using 4 sets of an M6 screw （except for 1640*990*35series,1650*990*35series,1960*990*50 series ,1970*990*50 series using 8 sets of an M6 screw）, two flat washers, a split washer and an M6 nut. The material of the screw、washers and nut is stainless steel, and the torque of M6 screw assembly is 2.6 N.M. The recommended standoff height is 11cm.

Clamp Mounting:

The mounting method has been qualified by LightWay and certified by VDE. Follow mounting guidelines recommended by the mounting system supplier. Each module must be securely fastened at a minimum of 4 points on two long side frames. Install and tighten the module clamps to the mounting rails using the torque stated by the mounting hardware manufacturer. System designer and installer are responsible for load calculations and for proper design of support structure. LightWay warranty may be void in cases where improper clamps or unsuitable installation methods are found.



Detail of clamps

When installing inter-modules or end type clamps, take measures so as

⊙Not to bend the module frame

⊙Not to touch or cast shadow on the front glass

⊙Not to damage the surface of the frame

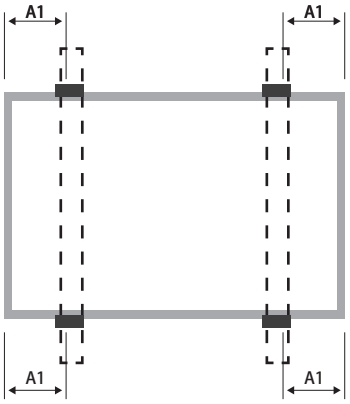
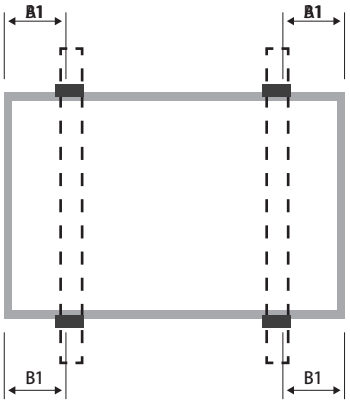
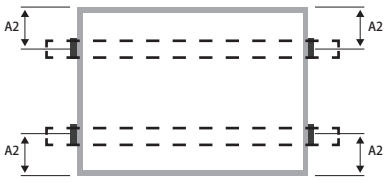
⊙To ensure the clamps overlap the module frame by at least 9 mm.

⊙To ensure the clamps overlap length is at least 50 mm.

Clamp material should be anodized aluminum alloy. Floating type clamps are not authorized.

Clamp positions are of crucial importance for the reliability of the installation, the clamp centerlines must only be positioned within the ranges indicated in table below, depending on the configuration and load. For configurations where the mounting rails run parallel to the clamps installation side, precautions should be taken to ensure the module frame (C-shape) overlap the rail by 15mm or more.

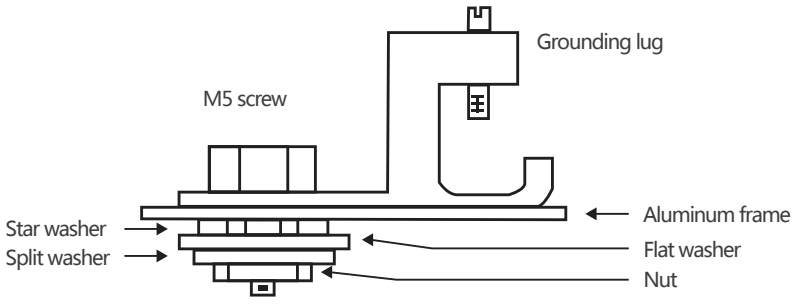
If other mounting means are employed. Please refer to the drawings as below in detail.

	Uplift load≤2400 Pa Down force load≤2400 Pa	Uplift load≤2400 Pa Down force load ≤ 5400 Pa
Clamping on long side frame	Use 4 clamps on the long side, the allowed range depends on the module type.  Mounting rails may run perpendicularly or parallel to the long side frame	Use 4 clamps on the long side, the allowed range depends on the module type.  Mounting rails may run perpendicularly or parallel to the long side frame
Clamping on short side frame	Use 4 clamps the short side , the allowed range depends on the module type. Mounting rails may run parallel or perpendicularly to the short side frame 	

Module type	A1 range (mm)	B1 range (mm)	A2 range(mm)
1310*990*35	240-320	280-320	200-250
1310*990*40	220-340	270-330	200-250
1310*990*50	200-360	250-350	200-250
1495*990*35	260-390	340-390	200-250
1495*990*40	240-410	330-400	200-250
1495*990*50	220-420	350-410	200-250
1640*990*35	260-390	360-390	200-250
1640*990*40	240-410	340-410	200-250
1640*990*50	230-420	330-420	200-250
1650*990*35	260-390	360-390	200-250
1650*990*40	240-410	340-410	200-250
1650*990*50	230-420	330-420	200-250
1960*990*50	340-550	400-500	200-250
1970*990*50	340-550	400-500	200-250

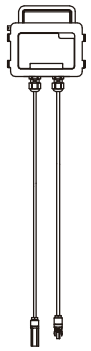
Grounding

The module frame must be properly grounded. The grounding wire must be properly fastened to the module frame to assure good electrical contact. Use the recommended type, or an equivalent, connector for this wire.
If the support frame is made of metal, the surface of the frame must be electroplated and have excellent conductivity.
We recommend the lay-in lug when grounding (the wire diameter is 6mm2). First strip 16mm insulating jacket from the end of the ground wire carefully to avoid nicking or cutting conductors, insert the wire to the feet of the lug, and screw down the slotted screw. Be careful not to damage the wire core. And then tighten up the screw.
Next, assemble the recommended grounding lug to the aluminum frame using stainless steel M5 screw and hardware as shown below. The star washer is fitted directly under the grounding lug and makes electrical contact by penetrating the anodized coating of the aluminum frame. The screw assembly is further fitted with a flat washer, then a split lock washer and finally a nut to secure the entire assembly, as shown below.



MODULE TERMINATIONS

A junction box as terminal enclosure is equipped for electrical connections on lightway PV modules. Please contact your local dealer with questions regarding other electrical connections for modules. Modules equipped with one j-box contain terminals for both positive and negative polarity, and bypass diodes.



Sketch of Junction box

Bypass Diodes

When the modules in series strings are shaded partially, it may cause a reverse voltage across cells or modules, because the current from other cells in the same series is forced to flow through the shaded area, and then undesirable heating may occur. The use of a diode to bypass the shaded area can minimize both heating and reduction of array current. All Lightway PV modules are equipped with factory installed bypass diodes. The factory-installed diodes provide proper circuit protection for the systems within the specified system voltage, so that you do not need any other additional bypass diodes. Contact your authorized Lightway distributor or dealer for proper diode type, if necessary to add or change diodes due to system specification.

Testing, commissioning and troubleshooting

Test all electrical and electronic components of the system before using it. Follow the instructions in the guides supplied with the components and equipment.

⊙ Testing modules connected in series before they are connected to system.

Check the open-circuit voltage of every series module by a digital multimeter. The measured values should correspond to the sum of the open-circuit voltage of the individual module. You will find the rated voltage in the technical specifications of the type of the module used. If the measured value is significantly lower than the expected value, please proceed as described under "Troubleshooting an excessively low voltage".

Check the short-circuit current of every series circuit. It can be measured directly by a digital multimeter connected in the two terminals of series circuit or module, or with any load such as PV illumination to make a rough measurement. Attention, the rated scale of the ammeter or the rated current of load should more than 1.25 times of the rated short-circuit current of series module. You will find the rated current in the technical specifications of the type of module used. The measured value can vary significantly, depending on weather conditions, the time of day and shading of the module.

⊙ Trouble shooting low voltages

Identify the commonly low voltage and excessively low voltage. Commonly the low voltage mentioned here is the decrease of open-circuit voltage of the module, which is caused by the temperature rising of solar cells or lower irradiance. Excessively low voltage is typically caused by improper connections at the terminals or defective bypass diodes.

MAINTENANCE

General

Lightway recommends that PV systems be periodically inspected by the installer, or other qualified person.

The purpose of the PV system inspection is to ensure that all system components are functioning properly. At a minimum, this inspection should confirm the following:

– All cables and connector attachments are undamaged and properly secured
– No sharp objects are in contact with the PV module surfaces
– PV modules are not shaded by unwanted obstacles and/or foreign material
– Mounting and grounding components are tightly secured with no corrosion

Defects should be addressed immediately.

Cleaning

Dirt and dust can accumulate on the glass surface of the module over time, reducing its power output. Lightway recommends routine cleaning of PV modules to ensure maximum power output, especially in regions with low precipitation.

⊙ In order to reduce the potential for electrical and thermal shock, Lightway recommends cleaning PV modules during early morning or late afternoon hours when solar radiation is low and the modules are cooler, especially in regions with hotter temperatures.

⊙ Never attempt to clean a PV module with broken glass or other signs of exposed wiring, as this presents a shock hazard.

⊙ Clean the glass surface of the PV modules with a soft brush using soft, clean water with a recommended pressure less than 690kPa, which is typical of most municipal water systems. Water with high mineral content may leave deposits on the glass surface and is not recommended.

⊙ Lightway PV modules may contain a hydrophobic anti-reflective coating on the glass surface to enhance power output and reduce dirt and dust buildup. In order to avoid module damage, do not clean PV modules with a power washer or pressure washer. Do not use steam or corrosive chemicals to facilitate the cleaning of modules. Do not use aggressive tools or abrasive materials that could scratch or damage the glass surface. Failure to comply with these requirements may adversely affect the PV module performance.

⊙ Lightway PV modules are designed to withstand high snow loads. However, if removing snow is desired to enhance production, use a brush to gently remove snow. Do not try to remove frozen snow or ice from PV modules.

RECYCLING

Lightway is a full member of PV Cycle, the European association for voluntary take back and recycling of PV modules. Please contact PV Cycle at www.pvcycle.org for details regarding the recycling process.

DISCLAIMER OF LIABILITY

⊙ Because the use of this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic product are beyond Lightway's control, Lightway does not accept responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance.
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